Chapter - I

INTRODUCTION

Introduction

In the present globalization scenario, due to vast expansion of large scale manufacturing activities, most of the researchers are focusing on studying the growth aspects related to manufacturing. Equally important is the service sector, which is enhancing the satisfaction of the customers. For instance, in the field of automobile service sector, the service attributes like quality, cost, and delivery influence the satisfaction of the customers, are key factors to increase Sales as well as production of automotive vehicles. In this backdrop, studies on improving the service sector are also equally important with the manufacturing.

Service sector industries such as maintenance of automobile vehicles, hotels, travels etc., plays a greater role apart from design, manufacturing and marketing industry. Automobile industry has shown an exponential growth over the past two decades. Furthermore, the demand is expected to grow at an increased rate for the next two decades or so. The very basic objective of all the vehicles is mobility. This mobility, though in various forms, can be primarily either personal or public mobility. Unless and until the vehicles are properly maintained, the basic objective of mobility will not be served
completely. For vehicles, maintenance can be achieved either by periodic maintenance, preventive maintenance, or breakdown maintenance.

Literature shows that there is a huge gap between sales volume of vehicles and number of service centers, and the service rendered by the service centers and the gap is steadily increasing. Naturally, the delivery of the vehicle decreases which directly impacts the satisfaction of the customers. In view of the importance of these issues, in the present work four wheeler automobile service sector is considered.

1.1 Background of the Study

Peter Drucker (1967) refers automobile industry as the “Industry of Industries”. It is the backbone of petroleum, steel and manufacturing sectors. It creates employments for thousands and gave birth to many entrepreneurs. It satisfies one of the most basic needs of human being, mobility. It is a well-known fact that automobile Industry is the cornerstone of some of the most influential economics in the world like USA and Japan. Indian automobile industry is all set to play the same role in Indian economy. Indian automobile industry is one of the most modern, growing and vibrant automobile markets on the global map. The four-wheeler market in India is also one of the fastest growing and most promising. No
wonder, it has become a centre of attraction for most of the global automobile players.

In India automobile passenger vehicles sales rates are increasing every year. As the sales volume of four wheeler automobile passenger vehicles increases the service centre and service rendered by the centers for maintenance of vehicles also should increase proportionally. But the gap between sales volume of vehicles and service centers is increasing gradually. To fill the gap between sales and service, the author feels the need to study the servicing centers and improving the service rate of the vehicles by the servicing centers. The author collected data of sales turnover of four wheelers in India during 1998-2008 (10 years). Fig. 1.1 shows the variation of sales growth and service growth with the number of vehicles for the past 10 years. From the figure it can be found that the gap between sales and service is increasing with the increase in sales turnover of vehicles. The gap between the sales and service can be minimized by decreasing the waiting time in service using optimization of sequencing of bottleneck operations. With the rapid growth in sales of four wheelers in India, author has chosen the present work to cater the needs of four wheeler automobiles service sector.
Fig. 1.1: Sales growth Vs Number of Service centers
1.2 Overview of Indian Automobile Industry

The Indian automotive industry is complex and different from the automotive industry in the West. It comprises different categories: two wheelers, three wheelers, passenger cars, light commercial vehicles (LCVs), multi-utility vehicles (MUVs) and heavy commercial vehicles (HCVs) agricultural and farm and earth moving equipment. Some of these manufacturers are lead players in more than one category. The Indian automotive industry began in 1950s, and has grown under a highly regulated and projected economic environment. The firms were subjected to strict product specific capacity licensing, foreign collaboration, asset size and scope of industrial operations. As a result, very few firms dominated all the products. These restrictions provided no motivation or incentive for the firms to bring about technological improvements and new management strategies. In addition, capacity licensing restricted Indian firms from enjoying the scale advantages. With the new industrial policy of late 1980s and early-1990s, the Indian government deregulated entry into the automotive industry, dispensed with the use of licenses to control output levels, and significantly reduced import tariffs on auto components.

The far-reaching economic reforms undertaken since 1991 have unleashed the growth potential of the Indian economy. A series of “second generation reforms” aimed at deregulating the country and stimulating foreign investments have moved India firmly in to the
front ranks of the rapidly growing Asia pacific region. After liberalization of the industrial policy, new 100% subsidiary of foreign manufacturers and several new joint ventures agreements for manufacture of cars/multi-utility vehicles, with Indian companies have been set up. In India there are more than 450 foreign collaborations. India is the fourth largest manufactures of cars in Asia. Fig. 2 shows the % sales turnover of four wheeler passenger automobiles of various automotive manufacturers in India. Figure clearly shows that Maruti udyog limited (MUL) is the market leader with 60% share of the passenger car and multi-utility vehicles in India. Hence in the present work Maruti four wheeler service centres are chosen for study.

Fig. 1.2: Sales Turnover of Various Automobile Manufacturers in India
The setting up of joint ventures has also led to enhanced capacity creation in the vehicle sectors, particularly in the passenger car sector, and the additional capacity is expected to mount by one million passenger cars in the next 4-5 years. The liberalization of the automotive industry was also aimed at components manufacturing sector that was reserved for small sector. Automotive firms that came under the purview of the monopolies and restrictive trade practices and foreign exchange regulation act were permitted to enter several areas, which only restricted to the public sector. With the end of imports restriction aimed at reducing the outflow of foreign exchange and the introduction of more liberal import policies, importers of capital equipment are currently allotted nearly 50 percent increase of their foreign exchange quota.

These changes led to an influx of globally competitive auto assemblers into the Indian passenger car market. World-class firms entered this market segment, which had only four passenger car assemblers previously. As a result of this influx of assemblers, planned production capacity now exceeds the estimated demand for cars in the country. Competition among assemblers has become intense, and as a consequence firms are increasingly being innovative in order to reduce costs, enhance quality, and improve their performance and responsiveness to customers’ demands.
To achieve these goals, existing firms as well as new entrants are all attempting to improve their supply chains and implement lean production techniques. Indeed, there is sufficient evidence (Hum, 1990) that local firms have been attempting to adopt different management practices, such as TQM, BPR, JIT, SCM and other new concepts enhances performance within and across the organizations.

Indian automobile sector seems to be still characterized by the following factors (Saad and Patel, 2002):

- Indian automotive sector is fragmented with a large number of auto assemblers in all the segments of the industry as these firms may not be able to reap the benefits of economies of scale.
- The continued high levels of tariffs imposed on import products and components aimed at using local suppliers is hardly working as a result of their limited level of technological capability, poor quality and lack of reliability in terms of delivery.
- A large number of players in the automotive components sector (with over 300 small and medium sized firms servicing 24 automobile companies).
- Around 30 percent dependency upon small scale organizations producing and selling unbranded products.
- Only one third of Indian auto components manufacturing companies are ISO 9000 certified.
- Automotive component suppliers are avoiding strong dependency on assemblers by actively dealing with the after sales.
1.3 Scope of the Study

In this thesis, study of four wheeler automobile service sector in India has been taken. Particularly, Maruti vehicles and service rendered by its service centers is considered. The author studied and analyzed the problem of waiting time and total average service time and suggested the best sequence of maintenance activities to minimize the waiting time and total average service time of a vehicle in order to meet prompt delivery and minimize the number of pending vehicles. This can be extended to study of vehicles of the other manufacturers of passenger, commercial, light vehicles, heavy vehicles and two and three wheeler vehicles in India and abroad.

1.4 Outline of the Thesis

The chapter wise summary and the work done in this thesis are presented briefly.

Chapter I: Introduction

This describes the importance of growth of the service sector. This describes background of the study and motivation for this research work. This chapter also deals with the importance of Indian Automobile Industry and emphasizes the over all out line of the Thesis to improve the service sector.
Chapter II: Literature Review

This chapter reviews literature of questionnaire based survey selected to various fields and also related to service Industry. It reviews literature on discrete event simulation related to different fields and also related to queue lengths and maintenance areas. It also reviews literature on sequencing related to relevant fields.

Chapter III: Objectives and Methodology

This chapter defines research objectives and motivation for this research work. This chapter also emphasizes the methodology adopted to improve the service sector. The methodology also presented in the form of flow chart. This chapter also describes scope of the work.

Chapter IV: Questionnaire Based Survey on Automobile Service Centers in India

This chapter explains why an expert opinion survey is revised and how the questionnaire is designed and what survey methodology is adopted and explains the importance of research questions under each section namely details of respondent service centers, service priorities and attributes for service and various issues noticed in service centers, analysis of questionnaire by various graphs and statistical analysis techniques.
Chapter V: Discrete Event Simulation of Service Operations

This chapter deals with the simulation results and it explains the importance of discrete event simulation, types of simulation model. It explains how simulation model was developed to study the input data and analyzed the various waiting times, total average time and number of vehicles delivered for different combinations of input data, by plotting graphs. And also it explains the arrival pattern, service pattern of the data by using various distributions namely uniform distribution, triangular distribution.

Chapter V I: Optimization of Sequence of the Service Operations

To minimize the service time, an optimal sequence for the maintenance activities is proposed. To achieve this, a lexicographic search technique is used to generate the optimal sequence.

Chapter VII: Conclusions

The results are compared with the proposed sequence method and the existing sequence and delivery rates are also compared. This chapter also gives a list of areas where present study can be extended for future research. Limitation of the study is also presented.
1.5 Summary

This chapter presents brief introduction of the importance of service sector and its growth in India. This chapter also describes overall view of the Automobile Industry in India. It clearly indicates the gap between sales and service over period of one decade. This chapter also mentions background and need of the study. The related literatures on important aspects of modeling, optimization methods are presented in the next chapter.